***REMARKS***

Applicant thanks the Examiner for his time and for the Interview conducted on March 6, 2003. Applicant believes the Interview has advanced prosecution of the present application.

In the present application, claims 1-10 are pending. No claims have been amended, canceled or added herein.

In view of the following remarks, Applicant respectfully requests that the Examiner withdraw all rejections and allow the currently pending claims.

***Issues Under 35 U.S.C. § 103(a)***

Applicant's previous reply was rendered moot in view of the new ground of rejection (see the Office Action at page 7).

Claims 1-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over G. Franchini *et al.* (*J. Chem. Soc., Faraday Trans. 1*, **85**(7), 1697-1707 (1989); hereinafter "Franchini") in view of D.C. Baxter *et al.* (*Chem. Abstr.*, Vol. 112, 209884s; "Baxter") and I.B.S. Cunha (*Analyst*, Vol. 117, pp. 905-11 (1992); "Cunha") or B. W. Renoe *et al.* (*Analytical Chemistry*, Vol. 48, No. 4, pp. 661-66 (1976); "Renoe") and M. Bader (*Journal of Chemical Education*, Vol. 57, No. 10, pp. 703-6 (1980); "Bader"), H. Li (*Analyst*, Vol. 112, pp. 1607-9 (1987); "Li"), L.C. Rodriguez *et al.* (*Journal of AOAC International*, 78, No. 2 (1995); "Rodriguez") or Bo. E.H. Saxberg *et al.* (*Analytical*

*Chemistry*, Vol. 51, No. 7, pp. 1031-38 (1979); "Saxberg") (last seven references are newly cited and applied). Applicant respectfully traverses.

The Present Invention and Its Advantages

Conventional methods and devices for creating phase diagrams typically involve storage of a large number of liquid chemical mixtures (as taught by Applicant at page 1 of the present specification). Such large numbers of liquid chemical mixtures will have varying compositions or total concentrations at different temperatures until phase equilibria are established. For instance, there needs to be sufficient time and control to allow phase separations, formation of solutions or phase transitions (*i.e.*, melting; changes in crystallinity), etc., to occur.

Thus, as can be seen, these conventional methods and devices have drawbacks. With these methods and devices for phase diagrams, much effort and time is spent, and the procedures sometime have to be repeated several times in order to obtain complementary information. Even each round of testing for some procedures can take weeks or months to complete. In addition, none of the conventional methods and devices simplifies the procedure in obtaining a three-dimensional phase diagram with a physical and/or chemical property as a function

of temperature or component concentration (as explained by Applicant at the bottom of page 1 of the specification).

In contrast, the present invention has achieved a method and device that simplifies a procedure for three-dimensional diagramming, including phase diagramming (*i.e.*, see the features of independent claims 1 and 7). Specifically, the present invention is directed to a method and device for obtaining physical and/or chemical properties of a liquid, such as pH, viscosity, conductivity, and turbidity. In a rapid and simple manner, the present invention uses a large number of measuring points suitable for measuring a dependent property of a liquid as a function of two independent variables, namely temperature and concentration.

The unexpected advantages of the present invention include the minimum expenditure of time and labor in obtaining data in a form that allows an overview of the dependent variables over a wide range of temperature and concentration values. The instant invention is well suited for the production of three-dimensional diagrams by the application of computer technology. Such diagrams can then be analyzed, which may indicate where two or more phases co-exist in a mixture (as discussed by Applicant at page 6, starting at line 1). With the present invention, different combinations of data from measurements in turbidity, pH, etc., advantageously offer knowledge about the state of aggregation of dissolved species (*i.e.*, liquid

crystalline phases) as a result of changes in the independent variable of concentration or temperature.

In contrast to the present invention, the cited combinations of references (*e.g.*, Franchini with at least one of the other cited references) fail to disclose all features and advantages of the present invention.

Distinctions over the Cited Combinations of References

Applicant respectfully submits that a *prima facie* case of obviousness has not been formed with respect to the asserted combination of Franchini and at least one of the other cited references, because not all requirements for a *prima facie* case of obviousness have been satisfied.

*(A) Franchini*

The Franchini reference describes an empirical approach to clarify the dependence of the dissociation constant of weak electrolytes on the temperature and on binary ethan-1,2-diol and 2-methoxyethanol solvent systems (see Abstract). In Franchini, conductance data from an earlier work were integrated by those obtained from three new mixtures. These new mixtures were prepared with purely manual methods (see p. 1698 under "Procedure").

Specifically, the solvents were first prepared by weight. Then, the solutions of picric acid at different concentrations were obtained by successive dilution of stock solutions (freshly prepared by weight). The concentrations in volume were then calculated from the weight concentrations and the densities. The conductance readings were recorded when they became invariant with time, which is disclosed as taking 30 minutes for each measurement.

However, the Franchini reference fails to disclose automated control of dilutions, or automated control of dilutions in a single container (see also the Office Action at page 3). Further, the cited secondary references of Bader, Baxter, Cunha, Renoe, Li, Rodriguez and Saxberg fail to account for the deficiencies of Franchini, and these references have been improperly combined.

*(B) Bader and the Other Cited References*

The Bader reference relates to Standard Addition Methods ("SAM"), which are rather complex methods for quantitative analysis. In many cases, SAM gives better analyses than analyses using standards or calibrations curves. The other analyses based on standards or calibrations curves lead to errors caused by differences in properties, such as the pH, ionic strength, temperature, viscosity and impurities, etc., between the unknown sample and the standard.

In "Case 5," the Bader reference describes a SAM, where different solutions for analyzing were prepared without dilution. As an alternative, Bader states that it is also possible to make the increments of a standard with a known concentration to one sample with an unknown concentration, where the sample was analyzed before and after each increment addition. The concentration in the unknown sample can be determined using the results of the serial measurements. This method has shown considerable promise in the determination of Vitamin C by anionic polarography. When the next sample with another unknown concentration has to be determined, it is necessary to change the sample and to repeat the whole process with new measurements for each increment addition.

The other cited references of Baxter, Cunha, Renoe, Li, Rodriguez and Saxberg are asserted to disclose various features of the present invention (as discussed in the Office Action at page 3-6). The Baxter, Rodriguez, Li and Saxberg references, as well as Bader, disclose theoretical studies of different approaches to SAM, or investigation of the validity of specific SAM. The Renoe reference relates to a solution handling system, wherein Figure 1 on page 662 discloses a system that produces a large number of individual samples that have to be handled later. The Cunha reference is directed to gravimetric burettes and their supplies with suitable solutions for titration.

*(C) Combining Franchini and the Other Cited References*

The conclusion of why the cited references can be combined is as follows:

> It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the successive dilutions of Franchini with the successive additions of an analyte containing solution of known concentration according to the teachings of Bader, Li, Rodriguez or Saxberg because of the reductions of interferences due to matrix effects and the greater accuracy through use of a standard additions method as taught by Bader, Li, Rodriguez and Saxberg.

Baxter, Cunha and Renoe are subsequently discussed (pages 6-7 of the Office Action). However, Applicant respectfully submits that not all requirements for a *prima facie* case of obviousness have been satisfied.

U.S. case law squarely holds that a proper obviousness inquiry requires consideration of three factors: (1) the prior art reference (or references when combined) must teach or suggest all the claim limitations; (2) whether or not the prior art would have taught, motivated, or suggested to those of ordinary skill in the art that they should make the claimed invention (or practice the invention in case of a claimed method or process); and (3) whether the prior art establishes that in making the claimed invention (or practicing the invention in case of a claimed method or process), there would have been a reasonable expectation of success. *See In re Vaeck*, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991); *see also In re Kotzab*, 55 USPQ2d

1313, 1316-17 (Fed. Cir. 2000); *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988). Here, these three requirements have not been satisfied for the following reasons.

As mentioned, the Franchini reference fails to disclose automated control of dilutions or automated control of dilutions in a single container. Even when referring to pending claim 1, there is no disclosure in Franchini of all claimed features (*i.e.*, Franchini is completely manual; etc.). The lack of disclosure in Franchini holds true for the other claims as well (*i.e.*, claim 3; claim 7). Similarly, the cited secondary references fail to disclose all features as instantly claimed and do not account for the deficiencies of Franchini et al. Any combination of the cited references fails to disclose all steps of claim 1, and all features of claim 7. Thus, Applicant respectfully submits that a *prima facie* case of obviousness has not been formed because not even the first requirement of disclosure of all claimed features has been satisfied.

Further, Applicant submits that the cited secondary references have been improperly combined to account for the deficiencies of Franchini, and that the other requirements for a *prima facie* case of obviousness have not been satisfied.

As mentioned, Franchini is combined with the secondary references, such as Bader, because "It would have been obvious to one of ordinary skill in the art ... to replace the successive dilutions

of Franchini with ... according to the teachings of Bader ... because of the reductions of interferences due to matrix effects and the greater accuracy through use of a standard additions method as taught by Bader ...". However, one of ordinary skill in the art would not be motivated or reasonably expect to be successful in combining Franchini with a reference like Bader because Bader discloses a different method, wherein the method involves relatively much more time and labor, and fails to disclose taking measurements for a large number of data in order to obtain a three-dimensional diagram.

In Bader, the sample has to be changed and the procedure repeated. Thus, the SAM method as disclosed in Bader is much more time consuming than other conventional methods of measuring a response of the unknown concentration and comparing this response with standards or calibration curves. In other words, the analyses disclosed in the Bader reference involve a large amount of time and labor. This is in contrast to the present invention, wherein the present invention measures a dependent property in a relatively rapid and simple manner.

Though reference is made to the accuracy of the method in the Bader reference, Applicant respectfully submits that any cited reference used for a rejection under 35 U.S.C. § 103(a) must be considered in is entirety, *i.e.*, as a whole, including those portions that would lead away from a claimed invention. *See W.L. Gore &*

*Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). In other words, the Bader reference must be read in its entirety, including the disclosure that SAM involves much more time and labor than what is needed with the present invention.

Furthermore, the Bader method in "Case 5" is only applicable when the response is proportional. In contrast to Bader, the present invention measures a dependent property as a function of two independent parameters, temperature and concentration, and the dependent property is not expected to be proportionally dependent on the temperature and the concentration. This is an additional reason as to why one of ordinary skill in the art would not be motivated in combining Franchini with Bader (or any of the other cited references) in order to achieve the present invention.

Also, Bader is not concerned with the measurements of a large number of data for a three-dimensional diagram, where temperature and concentration are independent variables as the present invention. Instead, one of ordinary skill in the art, upon reading Bader, would understand that the cited reference concerns the quantitative determination of an unknown concentration of a compound in a sample. So instead of discussing a means of achieving the present invention, the Bader reference is completely silent regarding the creation of a three-dimensional diagram.

One of ordinary skill in the art would not be motivated or reasonably expect to be successful in combining Franchini with the other cited references as well.

Renoe uses a large number of samples that have to be handled later, instead of the presently claimed method that involves one sample, and one sample that is directly produced in the measuring cell.

Cunha involves burette quantitative analyses of a components performed by titration. In the present invention, there is no titration or other quantitative analyses that are performed in the measuring cell. In contrast to Cunha, the present invention involves amending the temperature and concentration of the component in a predetermined way, while at least one dependent physical or chemical property is being measured. Cunha does not disclose the steps of pending claim 1 or the equipment as instantly recited in claim 7.

Baxter, Rodriguez, Li and Saxberg disclose theoretical studies of different approaches to SAM, or investigation of the validity of specific SAM. However, there is no disclosure in these secondary references that would account for the deficiencies of the primary Franchini reference or the other each other. There is simply no disclosure of all features as instantly claimed, whether combined with Franchini or not. Thus, there cannot be any motivation to combine such references in order to achieve the present invention.

Any such combination(s) would still be missing features of the present invention.

Further, Applicant submits that in contrast to the cited combinations of references, the present invention does not involve an analysis of a concentration since the concentration of all solutions are known, and all measurements for the whole three-dimensional diagram are made in the same sample. The same cannot be said of the cited references of Franchini, Bader, etc.

Moreover, the temperature of the liquid in the measuring cell of the present invention is changed in a predetermined way, and the dependent parameter is measured as a function of the concentration and temperature. The references cannot be properly combined to achieve the present invention. For example, in contrast to the present invention, the temperature in the method disclosed in Case 5 by Bader is kept constant, and is not an independent variable. The temperature is constant in the Bader method because a change would adversely affect the accuracy of the analysis.

Thus, there are many reasons why one of ordinary skill in the art would not be motivated or reasonably expect to be successful in combining the cited references. Further, the cited combinations of references do not even disclose all features of the present invention.

Accordingly, Applicant submits that Franchini and any other cited secondary references, such as Bader, have been improperly combined. While a reference need not expressly teach that the disclosure contained therein should be combined with another, *see Motorola, Inc. v. Interdigital Tech. Corp.*, 43 USPQ2d 1481, 1489 (Fed. Cir. 1997), the showing of combining references "must be clear and particular". *See In re Dembiczak*, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Here, there is no clear guidance in Franchini to use the time-consuming SAM of Bader, or any of the other references, in order to achieve the methods and devices as presently claimed.

Further, as mentioned above, the process disclosed in Franchini is completely manual. Thus, neither the Franchini reference nor the Bader reference contains any disclosure as to how to produce a three-dimensional diagram.

With regard to the cited references and the reasons for combining them, the USPTO appears to consider the technical problems as being the need for greater accuracy, matrix effects, etc. (see page 6 of the Office Action). However, it is unreasonable to phrase the problem in these terms. First, this approach does not take into account whatsoever of the specific technical problem that is clearly stated in the present specification and as mentioned above (see page 1 of the specification). Second, considering the problem to be solved in the Examiner's terms implicitly includes a direction to the

solution to the problem. This itself is unreasonable because the cited references ought to be considered without the benefit of hindsight reconstruction. In the present circumstances, Applicant submits that it is much more appropriate to consider the problem to be solved as that phrased at page 1 of the present specification.

One having ordinary skill in the art, faced with the problem as described in the specification, would not refer to the cited secondary references when seeking a solution. Even if these references were considered, one having ordinary skill in the art would not know how to proceed since these references are completely silent about the time and labor problems as explained in the present specification.

Thus, Applicant respectfully submits that the cited rejections are overcome.

*(D) Conclusion*

Based on the above remarks, Applicant respectfully submits that the present invention is patentable over the cited combinations of references. Thus, Applicant respectfully requests the Examiner to reconsider, and to withdraw all rejections and allow the currently pending claims.

A full and complete response has been made to all issues as cited in the Office Action. Applicant has taken substantial steps in

efforts to advance prosecution of the present application. Thus, Applicant respectfully requests that the Examiner pass the application to issue.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact D. Richard Anderson (Reg. No. 40,439) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. § 1.17 and 1.136(a), Applicants respectfully petition for a one (1) month extension of time for filing a response in connection with the present application. The required fee of $55.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

#40,439

By _____
Joseph A. Kolasch, #22,483

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

JAK/DRA/ETP
2964-0102P